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FOREST INSECT SURVEY

PLUMAS NATIONAL FOREST AND ADJACENT PRIVATE LANDS

SEASONS OF 1949 AND 1950

By

E. T. Engen

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Forest Insect Laboratory
29 Forestry Bldg., U. C.
Berkeley 4, California
January 25, 1951

FOREST INSECT SURVEY

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Annex I
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C2P5
1950

Submitted by:

E. T. Engen

E. T. Engen, Forester

Approved by:

F. P. Keen

F. P. Keen
Entomologist in Charge

Forest Insect Laboratory
29 Forestry Bldg., U. C.
Berkeley 4, California

FOREST INSECT SURVEY

PLUMAS NATIONAL FOREST AND ADJACENT PRIVATE LANDS

SEASONS OF 1949 AND 1950

INTRODUCTION

Forest insect-caused destruction of virgin ponderosa and Jeffrey pine timber resources in the Eastern Plumas Area has been measured and appraised on a sample plot basis by the Berkeley Forest Insect Laboratory since 1933. This annual inventory of stand depletion forms the basis for estimating the total merchantable timber mortality caused by bark beetles and other cambium-mining insects, provides the means for determining the location and extent of areas in need of control and furnishes loss trend data necessary for developing appropriate control recommendations when increasing infestations are detected. The forest insect survey also conducts sample plot loss cruises in east-side pine areas where selective type cuts were employed that removed from the stand only those over-mature, decadent trees considered to be highly susceptible to pine beetle attack. In addition to examining bark-beetle loss in the Eastern Plumas Area on an annual basis, this Laboratory has also conducted frequent extensive reconnaissance type surveys covering the mixed-conifer forests of the Westside Plumas Area in order to detect epidemic tendencies in the infestation pattern. When incipient epidemic loss is detected, quantitative sampling methods are employed to determine the nature, extent and intensity of the infestation and the need for control. Limited funds

and manpower prevented the establishment of an annual intensive survey of this west-side type until 1949 when it became possible to expand the scope and intensity of forest insect surveys over the entire California Region as a result of an increase in funds under the Forest Pest Control Act (Public Law 110, 80th Congress). Permanent sample plots were then established in the Westside Plumas Area to provide quantitative annual loss measurements and additional samples were installed in the Eastern Plumas Area to broaden the loss-estimate base for that reporting area. Time did not permit the establishment of enough sample strips to guarantee an adequate base for estimating the total insect-caused drain in the forest; consequently, additional strips are to be established as subsequent surveys are made.

Insect conditions in the different forest types represented by the Eastern and Westside Plumas Areas will be dealt with in separate sections of the report.

FIELD EXAMINATION:

1949

Personnel: Thomas McElroy, Boyd Wickman and E. T. Engen, Forest Insect Laboratory, Bureau of Entomology and Plant Quarantine, 29 Forestry Bldg., U. C., Berkeley 4, Calif.

Date: September 7 to 14, October 10 to 14, 1949.

1950

Personnel: Robert Chambers, Marius Wasbauer, and E. C. Clark.

Date: August 12 to 17, October 20, 1950.

Method: Spotting, measuring and recording infested trees occurring on roadside strips, trail strips and plots. Ground reconnaissance on areas not sampled by plot measurement plus an aerial examination of the entire forest in late October.

AREAS EXAMINED

Sample plot measurements were made throughout the virgin pine and selectively-cut stands of the Plumas National Forest, and adjacent private lands, subdivided into reporting areas as shown on the appended map.

EASTERN PLUMAS AREA

IMPORTANT FOREST INSECT CONDITIONS REVEALED BY THE SURVEY

1948 Infestation

Depletion of Eastern Plumas Area timber resources due to bark-beetle infestations in 1948 was comparatively light and scattered. Insect-killed merchantable timber in the remaining virgin stands make up the bulk of loss. Bark-beetle activity in the extensive cut-over reserve stands was generally negligible; however, young white fir in a recently-cut area in the Dixie Valley unit was heavily attacked by fir engraver beetles and losses were group-wise and heavy in this localized area. Jeffrey pine beetle was increasingly aggressive in Jeffrey pine timber. Pine engraver beetles were also active in pole-sized Jeffrey pines heavily infected with western dwarf mistletoe.

1949 Infestation

A marked increase in tree mortality was apparent throughout the Eastern Plumas Area as a result of an increase in western pine beetle and Jeffrey pine beetle activity. Heaviest loss conditions were found in a rather extensive cut-over area centering around Camp 13 of the Clover Valley Lumber Company in the Squaw Valley entomological unit. Localized white fir loss was continuing on a slightly diminished scale in the 1948 cutting area in the Dixie Valley unit. Loss throughout the rest of the reporting area was more uniformly distributed and not excessive.

INSECTS RESPONSIBLE FOR TREE MORTALITY DURING 1948 AND 1949

Bark beetles were found to be the primary agents responsible for tree mortality during 1948 and 1949. The association of tree-killing insects and host species is as follows:

Ponderosa pine:
(1) The western pine beetle, Dendroctonus brevicomis Lec.
(2) The mountain pine beetle, Dendroctonus monticolae Hopk.
(3) The California flatheaded borer, Melanophila californica, Van Dyke.
(4) The pine engraver beetles, Ips spp.

Jeffrey pine:
(1) The Jeffrey pine beetle, Dendroctonus jeffreyi, Hopk.
(2) The California flatheaded borer.

Sugar pine:
(1) The mountain pine beetle.

White fir:
(1) The fir engraver beetle, Scolytus ventralis, Lec.
(2) The fir roundheaded borer, Tetropium abietis, Hall.
(3) A defoliating insect, unidentified at present.

CHARACTER OF INSECT INFESTATIONS

1948 Infestation

Mature ponderosa and Jeffrey pine, preponderantly of high risk to insect attack, make up the major share of endemic loss scattered throughout the east-side pine type. Some group killing by the Oregon pine engraver beetle was noted on the north-east slopes of Dixie Mountain and on the west slopes of the escarpment forming the boundary of the Little Last Chance entomological unit in pole-sized Jeffrey pines heavily infected with western dwarf mistletoe.

1949 Infestation

Increased insect activity in the Eastern Plumas Area resulted in an abrupt two-fold rise in pine mortality throughout this area. The major factor contributing to the sudden upswing was a 180 percent increase in Jeffrey pine mortality by the Jeffrey pine beetle; supplementing this was a 54 percent rise in ponderosa pine loss by the western pine beetle. Although measured loss is nearly double that of the previous year, there are no centers of group-killing. Instead the great bulk of loss is spread fairly regularly throughout the timber type. Heaviest loss occurred in the area around Camp 13 which was cut over in the late 1930's. Loss in this reserve stand is primarily the result of progressive flatheaded borer attacks and, while not of epidemic proportions, it is higher than loss sustained on the surrounding areas. Very little tree mortality could be attributed to pine engraver beetle infestations in either virgin or cut-over stands.

TREND OF BARK-BEETLE INFESTATIONS

Measurement of insect-caused mortality on permanent sample plots augmented by extensive ground and aerial reconnaissance indicates the general trend of bark-beetle infestations throughout the Eastern Plumas Area is upward, above the level of loss sustained in 1948. Bark beetle-caused loss in 1949 on the sample plots increased approximately 110 percent, resulting in the highest rate of loss recorded since 1942. A graphic representation of the measured trend of loss for the Eastern Plumas Area covering the past 18 years is given in Figure 1.

INSECT-CAUSED LOSS ON SAMPLE PLOTS DURING 1948 AND 1949

The number of trees and board foot volumes of the various commercial timber species killed by bark beetles during 1948 and 1949 on the several

roadside strips and plots used in sampling loss conditions in the Eastern Plumas Area are given in Table 1. Previous forest insect survey reports indicate Jeffrey pine normally constitutes the bulk of insect-caused loss in the Eastern Plumas Area; however, a reduction in Jeffrey pine beetle activity and a sharp rise in western pine beetle activity in 1947 reversed the usual order of loss, and as a result, ponderosa pine made up the major proportion of the total insect-caused loss. In 1948, the usual pattern of loss began to appear as ponderosa pine loss dropped 41 percent and Jeffrey pine loss increased 15 percent. Plot measurements of the 1949 loss record a nearly threefold increase in Jeffrey pine mortality and indicate a loss pattern with Jeffrey pine in the majority has been established.

The following table affords a comparison of measured plot loss over the period from 1946 through 1949.

EASTERN PLUMAS AREA

AVERAGE BARK BEETLE-CAUSED LOSS ON SAMPLE PLOTS

Year	Board feet per acre			Percent of stand		
	P.P.	J.P.	Total	P.P.	J.P.	Total
1946	9.0	21.9	30.9	0.10	0.20	0.10
1947	32.9	13.6	46.5	0.28	0.14	0.22
1948	19.5	15.5	35.0	0.23	0.08	0.13
1949	30.1	43.7	73.8	0.36	0.24	0.28

ESTIMATED INSECT-CAUSED LOSS IN VIRGIN TIMBER STANDS DURING 1948 AND 1949

An expansion of the measured loss on sample plots to the remaining virgin acreage in the reporting area discloses that 2½ million board feet of ponderosa and Jeffrey pine was destroyed by bark beetles in 1948 and 6½ million board feet in 1949. The total estimated insect-caused loss for these years represents a reduction of the total green stand volume amounting to 0.18 and 0.50 percent respectively. Estimated loss on the several entomological units making up the Eastern Plumas Area is given in Table 2.

BARK BEETLE-CAUSED LOSS DURING 1950

Loss measurements on sample plots record only the amount of timber that has been attacked and killed by bark beetles up to the time the survey is conducted. Insect-caused mortality occurring after completion of the annual survey will not be recorded until another loss cruise is made the following year. As a result, a complete record of 1950 loss will not be available until the annual inventory of sample plots is made in 1951; however, the general trend and pattern of current loss may be appraised on the basis of partial records obtained this year. These data indicate ponderosa pine mortality will increase slightly and Jeffrey pine mortality will remain at approximately the same level for 1950. The net result will be an increase in insect-caused loss for the current year.

LOSS CONDITIONS IN THE CUT-OVER RESERVE STANDS

The character and pattern of insect infestations normally responsible for tree mortality in cut-over reserve stands is such that satisfactory appraisal of the severity of loss and need for control can be obtained by ground and aerial reconnaissance. If heavy insect-caused damage is present or pending an intensive survey employing sample plots and strips is employed to supplement the general reconnaissance method.

Loss in the cut-over reserve stands observed during the 1949 and 1950 surveys was generally endemic. Heavier than normal losses were present in reserve stands in the Squaw Valley unit, but there were no centers of aggressive infestations to be found in the Eastern Plumas Area.

Dixie Valley Cutover

The first large-scale attempt to control bark-beetle infestations through the selective removal of trees currently of high risk to insect attack was undertaken in 1941 on the Dixie Valley entomological unit.

High-risk ponderosa and Jeffrey pine on approximately 3,000 acres of government-owned land was cut under a sales contract by the Clover Valley Lumber Company at Loyalton, California. Subsequent to logging, a series of seven plots totaling 273 acres were established in the control area and inventoried annually in order to determine the effectiveness of this selective cutting for beetle control purposes. Complete records of loss for the nine years following the cutting show that cumulative insect-caused loss on the treated areas has amounted to 163 board feet per acre. During the same period untreated areas averaged 521 board feet per acre loss. The net result of the sanitation-salvage treatment amounts to a loss reduction of approximately 69 percent for nine years.

WESTSIDE PLUMAS AREA

IMPORTANT FOREST INSECT CONDITIONS REVEALED BY THE SURVEY

The loss survey for 1949 and 1950 included appraisal of insect conditions in all of the proposed and established working circles in the Westside Plumas Area as outlined on the appended map. Ground and aerial reconnaissance methods were supplemented with loss data from several sample plots.

1948 Infestation

Insect-caused loss was extremely light and evenly distributed throughout the virgin stands. Losses appeared heaviest in the mixed conifer stands and lightest in the fir stands at the higher elevations. The over-all pine loss resulting from bark-beetle attack was estimated to be approximately 14 board feet per acre. White fir loss was estimated to be 15 board feet per acre, while Douglas fir loss was negligible.

1949 Infestation

Pine loss during this year showed a slight increase over that of the previous year; however, forest insect destruction continued to be endemic in nature. Loss measurements on a limited number of sample plots indicate total pine volume loss will not greatly exceed 20 board feet per acre. Approximately 80 percent of this mortality is made up of sugar pine, the remainder is ponderosa pine. White fir loss dropped sharply during the same period totaling 2 board feet per acre. Light defoliation of white fir by a defoliating insect believed to be spruce budworm was observed in sections 21 and 24, T24N, R12E and sections 13 and 14, T23N, R10E, MDM, of the Feather River working circle. The degree and extent of the injury was not widespread and, at present, is not a cause for concern. Douglas fir mortality remained at a low level.

1950 Infestation

Total insect-caused loss during 1950 will not be completely evaluated until a survey is made in 1951 which will pick up the timber mortality occurring after the 1950 survey was completed. Information on hand, however, indicates that bark-beetle activity will increase and loss will be slightly higher than that sustained in 1949. The increase in ponderosa and sugar pine mortality will not approach epidemic proportions and by itself is no cause for alarm; however, the slowly rising loss trend manifested during the past two years should be kept under constant surveillance in order to permit the initiation of proper control action when bark-beetle infestations are approaching dangerous proportions.

CONTROL RECOMMENDATIONS

The annual forest insect survey of the Plumas National Forest is conducted for the purpose of determining the yearly stand depletion due to insect infestations and to detect potential forest insect outbreaks early enough to permit control action before infestations become widespread. The recent forest insect survey found no centers of aggressive infestations on the Plumas National Forest during the current season; consequently, control action is not needed.

Sanitation-salvage logging methods as employed in the Dixie Valley sale are applicable to east-side pine timber and should be incorporated whenever feasible in management plans covering such forest types in order to take advantage of the resulting reduced rate of loss.

U. S. BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

PINE LOSSES

1932 - 1949

Eastern Plumas Working Circle

Plumas National Forest, California

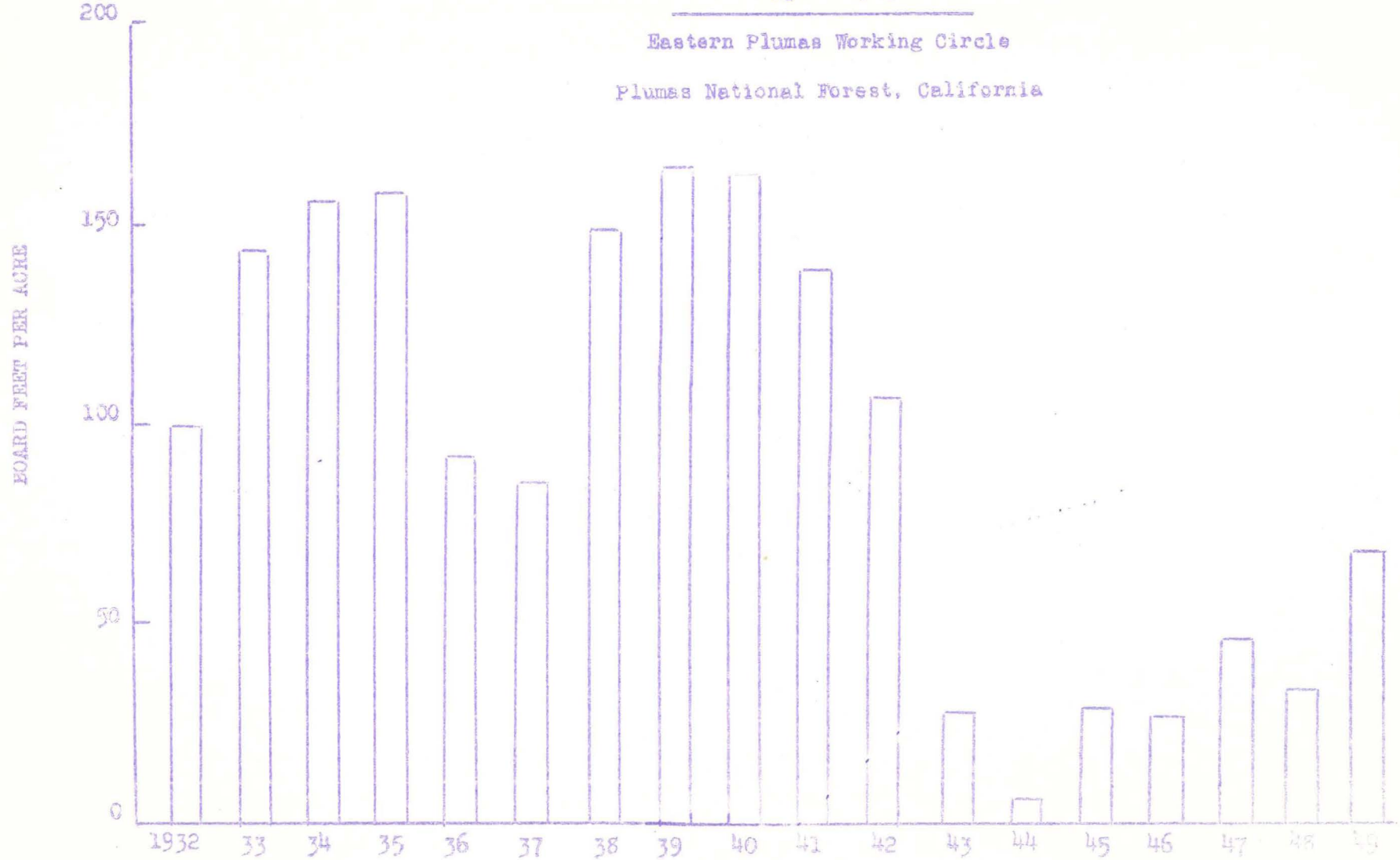

Table 1. Pine Timber Killed in 1948 and 1949 by Bark Beetles on Virgin Sample Plots. Eastern Plumas Area, Plumas National Forest, California

Ento. Unit	Sample Plot No.	Timb'd Acres	Hazard Rating	Pine Stand		Timber Killed in 1948				Timber Killed in 1949			
				Tree Spp.	Volume M.B.M.	No. of Trees	Volume (B.M.)	Vol./a	Percent of Stand	No. of Trees	Volume (B.M.)	Vol./a	Percent of Stand
Thompson Creek	RD-1	160	II-III	PP	3660	10	6640	41.5	0.18	15	27760	173.5	0.76
				JP	910	1	320	2.0	0.03	2	12980	81.1	1.43
	RD-2	160	II	PP	640	None	--	--	--	1	940	5.9	0.15
				JP	2610	7	11870	74.2	0.45	15	17650	110.3	0.68
	RD-15	160	III	PP	--	None	--	--	--	None	--	--	--
				JP	3670	1	3020	18.9	0.08	9	6120	38.2	0.17
	RD-16	80	III	PP	20	1	210	2.6	1.05	None	--	--	--
				JP	7220	None	--	--	--	3	4700	58.8	0.65
Cottonwood Creek	RD-5	160	III	PP	1880	7	11120	69.1	0.59	5	2740	17.1	0.14
				JP	1220	None	--	--	--	None	--	--	--
Last Chance	RD-4	160	III	PP	2310	1	2720	17.0	0.12	7	1080	6.8	0.05
				JP	1450	None	--	--	--	None	--	--	--
Ferris	RD-6	80	V	PP	380	1	330	4.1	0.09	None	--	--	--
				JP	450	None	--	--	--	None	--	--	--
Honey Lake	RD-3	40	II	PP	--	None	--	--	--	None	--	--	--
				JP	820	None	--	--	--	None	--	--	--
Little Last Chance	RD-14	80	III	PP	60	None	--	--	--	None	--	--	--
				JP	830	2	470	5.9	0.06	8	5710	71.3	0.69
TOTAL		1080		PP	8950	20	21020	19.5	0.23	28	32520	30.1	0.36
				JP	19180	11	15680	15.5	0.08	37	47160	43.7	0.24
				TOTAL	28130	31	36700	35.0	0.13	65	79680	73.8	0.28

Table 2. Estimated Pine Timber Killed by Bark Beetles. Eastern Plumas Area, Plumas National Forest and Adjacent Lands, California. Seasons of 1949 and 1950.

	Virgin Pine Stand (As of Jan. 1, 1949)			Pine Timber Killed in 1948				Virgin Pine Stand (As of Jan. 1, 1950)			Pine Timber Killed in 1949			
				No.	Volume		Percent				No.	Volume		Percent
Entomological Units	Acreage	Tree Spp	Vol. MBM	Trees	M.B.M.	bm/acre	stand	Acreage	Tree Spp	Vol. MBM	Trees	M.B.M.	bm/acre	stand
Thompson Creek	9,930	PP	110,432	189	109	11.0	0.10	9,930	PP	110,432	169	305	30.7	0.28
		JP	111,126	119	236	23.8	0.21		JP	111,126	307	441	44.4	0.40
		Total	221,558	308	345	34.8	0.16		Total	221,558	476	746	75.1	0.34
Cottonwood Creek	3,100	PP	8,768	56	107	34.5	1.22	3,100	PP	8,768	192	106	34.2	1.21
		JP	27,528	28	53	17.2	0.19		JP	27,528	254	141	45.5	0.51
		Total	36,296	84	160	51.7	0.44		Total	36,296	446	247	79.7	0.68
Last Chance	6,510	PP	45,530	91	146	22.5	0.32	5,530	PP	38,676	498	159	28.8	0.41
		JP	59,251	46	73	11.2	0.12		JP	50,332	664	212	38.3	0.42
		Total	104,781	137	219	33.7	0.16		Total	89,008	1162	371	57.1	0.42
Squaw Valley	1,290	PP	3,572	23	25	19.5	0.70	1,290	PP	3,572	26	29	22.6	0.81
		JP	12,364	13	20	15.5	0.16		JP	12,364	32	42	32.8	0.34
		Total	15,936	36	45	35.0	0.28		Total	15,936	58	71	55.4	0.44
Ferris	8,020	PP	21,356	72	85	10.6	0.39	6,000	PP	16,591	522	135	22.5	0.81
		JP	81,009	112	128	15.9	0.16		JP	59,822	696	179	29.9	0.30
		Total	102,365	184	213	26.5	0.20		Total	76,413	1218	314	52.4	0.41
Little Last Chance	15,650	PP	28,639	94	63	4.0	0.22	15,100	PP	28,464	272	189	12.5	0.66
		JP	171,283	219	167	10.7	0.10		JP	163,584	1057	755	50.0	0.46
		Total	199,922	313	230	14.7	0.12		Total	192,048	1329	944	62.5	0.49
Dixie Valley	2,320	PP	11,605	42	45	19.5	0.39	2,320	PP	11,605	60	70	30.1	0.60
		JP	24,877	23	36	15.5	0.14		JP	24,877	79	101	43.7	0.41
		Total	36,482	65	81	35.0	0.22		Total	36,482	139	171	73.8	0.47
Clover Valley	6,240	PP	6,425	75	81	13.0	1.26	6,160	PP	6,364	160	185	30.1	2.91
		JP	51,796	44	64	10.3	0.12		JP	51,161	209	269	43.7	0.53
		Total	58,221	119	145	23.3	0.25		Total	57,525	369	454	73.8	0.79
Honey Lake	17,630	PP	211,420	53	150	8.5	0.07	17,630	PP	211,420	1093	724	41.1	0.34
		JP	170,283	70	226	12.8	0.13		JP	170,283	1446	964	54.7	0.57
		Total	381,703	123	376	21.3	0.10		Total	381,703	2539	1688	95.8	0.44
Long Valley	21,120	PP	74,733	84	270	12.8	0.36	20,680	PP	73,176	1820	670	32.4	0.92
		JP	57,130	63	226	10.7	0.40		JP	55,939	1510	558	27.0	1.00
		Total	131,863	147	496	23.5	0.38		Total	129,115	3330	1228	59.4	0.95
Beckwourth	9,610	PP	9,032	173	88	9.8	0.97	9,610	PP	9,032	125	144	15.0	1.59
		JP	73,859	96	70	7.8	0.10		JP	73,859	163	209	21.8	0.28
		Total	82,891	269	158	17.6	0.19		Total	82,891	288	353	36.8	0.43
Total for Eastern Plumas Area	101,420	PP	531,512	952	1169	11.5	0.22	97,350	PP	518,100	4937	2716	27.9	0.52
		JP	840,506	833	1299	12.8	0.15		JP	800,875	6417	3871	39.8	0.48
		TOTAL	1,372,018	1785	2468	24.3	0.18			1,318,975	11354	6587	67.7	0.50

Table 2. Estimated Pine Timber Killed by Bark Beetles. Eastern Plumas Area, Plumas National Forest and Adjacent Lands, California. Seasons of 1949 and 1950.

	Virgin Pine Stand (As of Jan. 1, 1949)			Pine Timber Killed in 1948				Virgin Pine Stand (As of Jan. 1, 1950)			Pine Timber Killed in 1949			
				No.	Volume		Percent				No.	Volume		Percent
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		JP	27,528	28	53	17.2	0.19		JP	27,528	254	141	45.5	0.51
		Total	36,296	84	160	51.7	0.44		Total	36,296	446	247	79.7	0.68
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		Total	104,781	137	219	33.7	0.16		Total	89,008	1162	371	57.1	0.42
Squaw Valley	1,290	PP	3,572	23	25	19.5	0.70	1,290	PP	3,572	26	29	22.6	0.81
		JP	12,364	13	20	15.5	0.16		JP	12,364	32	42	32.8	0.34
		Total	15,936	36	45	35.0	0.28		Total	15,936	58	71	55.4	0.44
Ferris	8,020	PP	21,356	72	85	10.6	0.39	6,000	PP	16,591	522	135	22.5	0.81
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		Total	58,221	119	145	23.3	0.25		Total	57,525	369	454	73.8	0.79
Honey Lake	17,630	PP	211,420	53	150	8.5	0.07	17,630	PP	211,420	1093	724	41.1	0.34
		JP	170,283	70	226	12.8	0.13		JP	170,283	1446	964	54.7	0.57
		Total	381,703	123	376	21.3	0.10		Total	381,703	2539	1688	95.8	0.44
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		JP	57,130	63	226	10.7	0.40		JP	55,939	1510	558	27.0	1.00
		Total	131,863	147	496	23.5	0.38		Total	129,115	3330	1228	59.4	0.95
Beckwourth	9,610	PP	9,032	173	88	9.8	0.97	9,610	PP	9,032	125	144	15.0	1.59
		JP	73,859	96	70	7.8	0.10		JP	73,859	163	209	21.8	0.28
		Total	82,891	269	158	17.6	0.19		Total	82,891	288	353	36.8	0.43
Total for Eastern Plumas Area	101,420	PP	531,512	952	1169	11.5	0.22	97,350	PP	518,100	4937	2716	27.9	0.52
		JP	840,506	833	1299	12.8	0.15		JP	800,875	6417	3871	39.8	0.48
		TOTAL	1,372,018	1785	2468	24.3	0.18			1,318,975	11354	6587	67.7	0.50

R.4E. R.5E. R.6E. R.7E. R.8E. R.9E. R.10E. R.11E. R.12E. R.13E. R.14E. R.15E. R.16E. R.17E.

T. 28 N.
T. 27 N.
T. 26 N.
T. 25 N.
T. 24 N.
T. 23 N.
T. 22 N.
T. 21 N.
T. 20 N.
T. 19 N.
T. 18 N.

Chester
Westwood
Big Bend Camp
Janesville
Clarks Ranch
Milford
Doyle
Butte Mdws.
Keddie
Greenville
Quincy
Sterling City
Strawberry
Downieville
Sierra City
Beckwith
Portola
Vintan
Chilcoot
Loyalton
OROVILLE

LAKE ALMANOR
HONEY LAKE (dry)
Leavitt Lake Res.
Bold Mt.
Diamond Mt.
Stover Mt.
Coyote Pk.
Mt. Meadows Res.
Bidwell Pk.
Evans Pk.
Greenville Res.
Indian Valley Res.
Kettle Rock Lo.
Mt. Hough
Bell Hill
Grizzly Pk.
Table Mt.
Three Lakes
Bald Eagle
Buck Mtn.
Chambers Pk.
Grizzly Dome
Grizzly Mt.
Mt. Arana
Claremont
Deerwood
Chimney Rock
Blue Nose
Staffa Pk.
Mt. Tillmore
Mt. Washington
Deadwood Pk.
Rattlesnake Mt.
Gold L.
Salmon L.
Haskell Pk.
Meadow Lake
Meadow View
Mt. Ingalls
Mt. Jura
Indian Rock
Babcock Pk.
Bucks
Bucks Lake
Lake Davis Res.
Frenchman Res.
Antelope Lake
Big Bald Mt.
Glacier Mtn.
Stringtown Hill
Challenge
Konokta Pk.
Big Kimshew
Big Grizzly
Mt. Ararat
Mt. Ingalls
Mt. Hough
Mt. Jura
Mt. Ida
Coolbrith
Pennoyer Pk.
Adams Pk.
Black Mtn.
Kes Pk.
Long Cr.
Valley
Mt. Hough
Mt. Ingalls
Mt. Jura
Mt. Ida
Coolbrith
Pennoyer Pk.
Adams Pk.
Black Mtn.
Kes Pk.
Long Cr.
Valley

LAST CHANCE
EAST PLUMAS
FERRIS
SQUAW VALLEY
DIXIE VALLEY
LITTLE LAST CHANCE
GLOVER VALLEY
BECKWOURTH
MEADOW VALLEY
QUINCY
FEATHER RIVER
FRENCH CREEK
CASCADE
WOODLEAF
THOMPSON CREEK
COTTONWOOD CREEK
LONG VALLEY
SIERRA VALLEY

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

FOREST INSECT SURVEY

PLUMAS NATIONAL FOREST, CALIFORNIA
and ADJACENT PRIVATE LANDS

SEASON OF 1950

SCALE MILES
0 2 4 6

LEGEND

- Pine Timber Type
- Cutover Land, as of 1/1/50
- Boundary Lines
  - Working Circle Areas
  - Entomological Reporting Areas
  - Entomological Units
- Ground Samples
  - 13 Plot
  - (45) Roadside Strips
  - (62) Trail Strips